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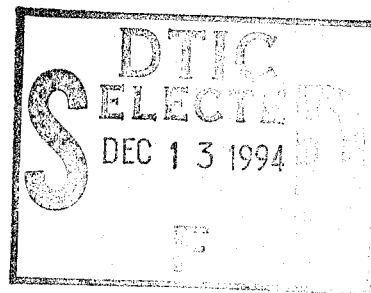
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**QUANTIFICATION OF SPECIAL OPERATIONS
MISSION-RELATED PERFORMANCE: PERFORMANCE DATABASE**



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The experiments reported herein were conducted according to the principles set forth in the current edition of the "Guide for the Care and Use of Laboratory Animals," Institute of Laboratory Animal Resources, National Research Council.

This technical report has been reviewed by the NMRI scientific and public affairs staff and is approved for publication. It is releasable to the National Technical Information Service where it will be available to the general public, including foreign nations.

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13. ABSTRACT (Maximum 200 words) In order to evaluate the impact of environmental and physiological stressors on the conduct of Special Operations activities and techniques to minimize the effects of these stressors, it has become essential to develop standardized measurements of Special Operations mission-related performance and to ensure that measures selected relate as directly as possible to actual operational tasks. In order to select/develop appropriate measures of performance, information was needed on critical performance abilities required for specific Special Operations activities. To obtain the required abilities information, a database was developed providing data obtained from experienced, senior operators regarding critical performance abilities necessary for fifty-six specific Special Operations activities.				
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QUANTIFICATION OF SPECIAL OPERATIONS MISSION-RELATED PERFORMANCE:

PERFORMANCE DATABASE

The United States Special Operations Command (USSOCOM) is evaluating the impact of environmental and physiological stressors on the conduct of Special Operations and techniques to minimize the effects of these stressors. In order to accurately evaluate these factors, it has become essential to develop standardized measurements of Special Operations mission-related performance and to ensure that measures selected relate as directly as possible to actual operational tasks. This will enable changes in performance to be accurately and reproducibly quantitated and will significantly enhance the applicability and usefulness of future Special Operations Medical Research and Development research.

In response to the requirement to develop standardized measures of performance, the present report provides an archival documentation of the USSOCOM mission-related performance database created as part of the research program focused on development of measures of mission-related performance. The initial research phase of the program is concerned with the selection / development of appropriate measures of performance based on information about critical performance abilities required for specific Special Operations activities. To obtain the required abilities information the mission-related performance database was developed. The present report presents the significant features of the database.

The database presents critical Special Operations performance abilities or skills required for a range of mission-related activities. The database was established based on input from interviews with experienced, senior operators from the following organizations:

- Naval Special Warfare Group Two
- Seal Team Two
- Seal Team Four
- Seal Team Eight
- SDV Team Two
- Naval Special Warfare Development Group

The operators were provided with a listing of mission-related activities as well as a listing of Special Operations performance abilities. They were asked, based on their experience and training, to indicate the particular abilities they thought were most critical for performing each of the listed activities. They were asked to respond only to mission activities with which they were thoroughly familiar. The rather comprehensive list of mission-related activities was generated by the Naval Special Warfare Command and represents a wide range of missions.

List of Mission-Related Activities:

Small Unit Tactics

- Patrolling
- Interdiction
- Assaults
- Takedowns (Hostage Recovery)
- Intelligence Gathering
- Demolitions
- Cold Weather Patrolling
- Long Distance Hikes with Load
- Map / Compass Reading
- Downed Pilot Recovery
- Laser Target Designation
- Tactical Deception
- Personnel Extraction

Shooting

- Sniping
- Ambush
- Takedown
- Patrolling

Combat Swimmer Operations

- Limpet Attack
- Shipboarding
- Hydrographic Reconnaissance
- VSW Mine Countermeasures
- Obstacle Loading
- Underwater Searches
- Boat Drop and Pickup

SDV Operations

- Ship Attacks
- Hydrographic Reconnaissance
- Over-the-Beach Operations
- Underwater Searches
- MK 16 / Air Combination Dives
- Intelligence Gathering
- Infiltration / Exfiltration
- Piloting
- Navigating

Urban Warfare

- Sprints
- Stair Climbing
- Jump to Wall / Window
- Wall Ascents
- Hostage Evacuations

High Speed Boat Operations

Dry Deck Shelter Hangar Operations

Submarine Lock-Out / Lock-In

Parachute Operations

- Static Line
- Free-Fall

Fast Rope

Rappelling

Helo Cast and Recovery

Small Boat Handling

- Distance Paddles
- Surf Passage
- Rock Portage

- Casualty Management
 - Patient Evaluation
 - Patient Resuscitation
 - Patient Evacuation

- Radio Operations
 - Radio Talking
 - Fire Support Calls

- Rock Climbing

The list of Special Operations performance abilities was developed from information provided by operators regarding critical basic skills and abilities required for the successful completion of missions. The information was obtained from personal interviews with senior operators and from the responses of experienced operators at the NSW Thermal Workshop held in 1991 in Virginia Beach, VA (Doubt TJ and Curley MD, Proceedings of the 1991 NSW Thermal Workshop, Naval Medical Research Institute Report 92-84, September 1992).

List of Critical Special Operations Performance Abilities:

- Cognitive (Mental)
 - Short Term Memory
 - Long Term Memory
 - Vigilance
 - Logical Reasoning
 - Decision Speed
 - Calculations
 - Acquiring Information
 - Display Recognition (SDV Controls)
 - Reaction Time

- Psychomotor
 - Manual Dexterity
 - Target Recognition
 - Hand Steadiness
 - Writing
 - Eye-Hand Coordination

Visual Acuity
Hearing Ability
Speaking Ability

Physical

Grip Strength
Swimming
Running
Load Bearing Hikes
Breath Holding
Vertical Jump
Climbing
Stamina
Cross Country Skiing
Load Towing (Skiing)
Balance / Equilibrium

The database was established by first summing the occurrences of each ability selected for each particular mission-related activity and then calculating a proportion (frequency) of the total abilities selected for that activity. The information was arranged in a relative format to account for the various ranges of abilities selected by different operators for each activity. The database lists the seven most frequently cited abilities (in order of frequency) for each activity. For example, the first mission activity presented in the database is Patrolling. The most frequently cited ability for the activity of patrolling is Vigilance. The number listed directly across from Patrolling, 85.3, is to be interpreted that 85.3% of the respondents selected Vigilance as a critical ability required in patrolling activities. The second most cited ability for Patrolling is Visual Acuity, in that 64.7% of the respondents selected Visual Acuity as important in Patrolling. The rest of the database is read in a similar fashion. Only seven abilities are provided for each activity as the consistency of responses becomes much more unreliable with further, less frequently cited abilities.

PERFORMANCE ABILITIES REQUIRED FOR MISSION ACTIVITIES

PATROLLING

Vigilance	85.3
Visual Acuity	64.7
Hearing Ability	64.4
Reaction Time	61.8
Stamina	61.5
Load Bearing Hikes	58.6
Logical Reasoning	50.0

ASSAULTS

Decision Speed	87.5
Reaction Time	78.1
Target Recognition	71.9
Vigilance	59.4
Stamina	56.3
Logical Reasoning	53.1
Short Term Memory	40.6

INTERDICTION

Vigilance	62.5
Target Recognition	59.4
Decision Speed	56.3
Reaction Time	53.1
Logical Reasoning	50.0
Acquisition	46.9
Visual Acuity	43.8

TAKEDOWNS (HOSTAGE RECOVERY)

Decision Speed	87.5
Reaction Time	74.2
Logical Reasoning	61.3
Target Recognition	61.1
Vigilance	45.2
Acquisition	41.9
Stamina	41.5

INTEL GATHERING

Long Term Memory	88.2
Short Term Memory	79.4
Acquisition	76.5
Vigilance	70.6
Visual Acuity	61.8
Target Recognition	55.9
Hearing Ability	50.0

DEMOLITIONS

Calculations	65.7
Long Term Memory	57.9
Vigilance	52.9
Logical Reasoning	47.1
Manual Dexterity	44.1
Short Term Memory	43.2
Hand Steadiness	41.1

COLD WEATHER PATROLLING

Stamina	76.9
Vigilance	73.1
Load Bearing Hikes	57.7
Long Term Memory	50.0
Short Term Memory	44.4
Logical Reasoning	44.3
Cross Country Skiing	41.2

LONG DISTANCE HIKES WITH LOADS

Load Bearing Hikes	90.6
Stamina	87.5
Vigilance	43.8
Running	34.4
Balance	31.3
Short Term Memory	23.9
Logical Reasoning	21.8

MAP \ COMPASS READING

Logical Reasoning	72.7
Calculations	66.7
Short Term Memory	57.6
Vigilance	51.5
Long Term Memory	47.5
Visual Acuity	45.4
Acquisition	37.3

DOWNED PILOT RECOVERY

Vigilance	62.5
Logical Reasoning	60.0
Target Recognition	55.3
Long Term Memory	51.5
Decision Speed	50.7
Stamina	50.0
Short Term Memory	46.7

LASER TARGET DESIGNATION

Vigilance	52.3
Target Recognition	50.0
Visual Acuity	46.2
Logical Reasoning	42.3
Calculations	38.5
Short Term Memory	36.6
Long Term Memory	34.5

TACTICAL DECEPTION

Logical Reasoning	84.6
Vigilance	61.5
Short Term Memory	53.8
Decision Speed	46.2
Long Term Memory	42.3
Acquisition	39.6
Reaction Time	38.4

PERSONNEL EXTRACTION

Decision Speed	62.1
Logical Reasoning	55.2
Vigilance	51.7
Target Recognition	37.9
Long Term Memory	36.5
Acquisition	34.5
Reaction Time	32.8

SNIPING

Hand Steadiness	73.3
Visual Acuity	70.0
Calculations	66.7
Vigilance	65.7
Target Recognition	63.2
Logical Reasoning	56.7
Long Term Memory	50.0

AMBUSH

Vigilance	67.6
Target Recognition	64.7
Decision Speed	63.8
Hearing Ability	61.6
Reaction Time	56.2
Visual Acuity	50.0
Logical Reasoning	44.2

TAKEDOWN (SHOOTING)

Target Recognition	75.9
Vigilance	67.5
Decision Speed	65.4
Logical Reasoning	62.1
Reaction Time	51.7
Eye-Hand Coordination	46.8
Visual Acuity	41.3

PATROLLING (SHOOTING)

Vigilance	74.2
Visual Acuity	64.5
Stamina	61.3
Acquisition	58.1
Logical Reasoning	57.8
Reaction Time	55.8
Load Bearing Hikes	53.1

LIMPET ATTACK

Swimming	79.4
Vigilance	67.6
Target Recognition	61.7
Short Term Memory	60.8
Logical Reasoning	58.7
Calculations	55.8
Long Term Memory	52.9

SHIPBOARDING

Climbing	63.3
Vigilance	62.1
Grip Strength	60.0
Decision Speed	56.3
Stamina	53.2
Logical Reasoning	50.0
Manual Dexterity	46.7

HYDROGRAPHIC RECON

Swimming	82.4
Acquisition	67.6
Breath Holding	48.2
Stamina	47.0
Calculations	46.1
Visual Acuity	44.0
Short Term Memory	41.2

VSW MINE COUNTERMEASURES

Vigilance	76.9
Long Term Memory	49.3
Decision Speed	47.8
Calculations	46.7
Swimming	46.0
Short Term Memory	40.5
Logical Reasoning	38.4

OBSTACLE LOADING

Swimming	72.7
Breath Holding	69.7
Vigilance	57.4
Manual Dexterity	54.8
Calculations	53.7
Stamina	48.4
Long Term Memory	42.4

UNDERWATER SEARCHES

Swimming	76.7
Vigilance	63.3
Short Term Memory	60.1
Acquisition	50.0
Logical Reasoning	48.7
Visual Acuity	46.6
Calculations	43.3

BOAT DROP AND PICKUP

Swimming	67.7
Vigilance	48.4
Reaction Time	41.9
Logical Reasoning	40.9
Calculations	39.3
Eye-Hand Coordination	38.7
Stamina	36.8

SHIP ATTACKS

Long Term Memory	64.6
Display Recognition	62.4
Vigilance	60.3
Logical Reasoning	54.8
Reaction Time	50.2
Swimming	50.0
Short Term Memory	37.5

HYDROGRAPHIC RECONS (SDV)

Vigilance	64.6
Acquisition	62.4
Long Term Memory	56.4
Calculations	54.6
Reaction Time	53.1
Swimming	50.0
Short Term Memory	37.5

OVER-THE-BEACH OPS

Vigilance	99.8
Reaction Time	62.5
Decision Speed	52.5
Swimming	51.8
Stamina	50.0
Short Term Memory	39.5
Long Term Memory	37.5

UNDERWATER SEARCHES

Vigilance	67.7
Swimming	48.4
Decision Speed	41.9
Acquisition	40.9
Short Term Memory	39.3
Long Term Memory	38.7
Logical Reasoning	37.4

MK 16 / AIR COMBINATION DIVES

Vigilance	85.7
Calculations	59.7
Swimming	57.1
Logical Reasoning	46.6
Display Recognition	44.9
Reaction Time	42.7
Short Term Memory	28.6

INTEL GATHERING (SDV)

Vigilance	62.5
Short Term Memory	40.4
Long Term Memory	39.8
Logical Reasoning	37.6
Acquisition	37.1
Reaction Time	36.0
Visual Acuity	34.8

INFILTRATION / EXFILTRATION

Vigilance	99.6
Logical Reasoning	42.6
Reaction Time	42.8
Short Term Memory	30.3
Long Term Memory	29.2
Decision Speed	28.6
Calculations	27.9

PILOTING (SDV)

Vigilance	71.4
Logical Reasoning	59.3
Display Recognition	57.1
Long Term Memory	49.4
Calculations	44.8
Reaction Time	42.7
Short Term Memory	28.6

NAVIGATING (SDV)

Vigilance	74.1
Logical Reasoning	59.7
Display Recognition	57.1
Long Term Memory	44.8
Calculations	43.9
Reaction Time	42.7
Short Term Memory	29.4

SPRINTS

Running	79.3
Stamina	69.0
Balance	34.5
Reaction Time	27.6
Short Term Memory	26.4
Vigilance	24.4
Decision Speed	22.1

STAIR CLIMBING

Stamina	78.6
Climbing	53.6
Running	46.4
Vigilance	34.6
Balance	32.1
Reaction Time	29.6
Vertical Jump	28.5

JUMP TO WALL / WINDOW

Vertical Jump	85.2
Stamina	59.3
Reaction Time	39.1
Climbing	37.0
Grip Strength	33.3
Vigilance	29.7
Eye-Hand Coordination	28.6

WALL ASCENTS

Stamina	74.1
Climbing	63.0
Grip Strength	51.9
Vertical Jump	44.4
Logical Reasoning	37.0
Reaction Time	29.9
Eye-Hand Coordination	29.6

HOSTAGE EVACUATIONS

Decision Speed	68.6
Reaction Time	66.0
Vigilance	59.3
Logical Reasoning	44.4
Short Term Memory	40.7
Long Term Memory	39.1
Acquisition	37.0

HIGH SPEED BOAT OPS

Stamina	77.3
Vigilance	63.6
Reaction Time	45.5
Decision Speed	44.9
Grip Strength	40.8
Short Term Memory	33.9
Eye-Hand Coordination	31.8

DDS HANGAR OPS

Decision Speed	90.9
Reaction Time	54.5
Vigilance	45.5
Logical Reasoning	45.3
Short Term Memory	37.5
Long Term Memory	36.4
Acquisition	27.3

SUBMARINE LOCK-OUT / LOCK-IN

Vigilance	73.9
Logical Reasoning	56.5
Manual Dexterity	47.8
Decision Speed	43.5
Long Term Memory	39.2
Swimming	38.1
Short Term Memory	34.8

STATIC LINE (PARACHUTE OPS)

Decision Speed	71.0
Reaction Time	70.9
Vigilance	67.7
Short Term Memory	48.4
Logical Reasoning	45.2
Long Term Memory	43.4
Manual Dexterity	41.8

FREE-FALL (PARACHUTE OPS)

Decision Speed	76.3
Reaction Time	75.0
Vigilance	67.9
Logical Reasoning	55.6
Manual Dexterity	53.5
Eye-Hand Coordination	42.9
Long Term Memory	39.3

FAST ROPE

Grip Strength	88.2
Vigilance	52.9
Manual Dexterity	47.1
Reaction Time	45.1
Eye-Hand Coordination	44.0
Decision Speed	36.3
Visual Acuity	35.2

RAPPELLING

Grip Strength	63.6
Vigilance	56.4
Manual Dexterity	54.4
Reaction Time	42.7
Eye-Hand Coordination	42.4
Decision Speed	39.6
Visual Acuity	36.4

HELO CAST AND RECOVERY

Vigilance	54.1
Swimming	50.0
Reaction Time	44.1
Manual Dexterity	38.2
Visual Acuity	36.8
Grip Strength	35.2
Logical Reasoning	32.4

DISTANCE PADDLES (SMALL BOAT)

Stamina	90.9
Grip Strength	45.5
Vigilance	39.4
Manual Dexterity	37.2
Logical Reasoning	36.4
Eye-Hand Coordination	33.3
Short Term Memory	24.2

SURF PASSAGE (SMALL BOAT)

Stamina	66.7
Vigilance	51.5
Logical Reasoning	47.4
Decision Speed	45.4
Reaction Time	42.4
Manual Dexterity	39.4
Eye-Hand Coordination	35.6

ROCK PORTAGE (SMALL BOAT)

Stamina	63.6
Vigilance	48.8
Logical Reasoning	48.4
Decision Speed	44.2
Reaction Time	38.6
Manual Dexterity	37.0
Eye-Hand Coordination	36.2

PATIENT EVALUATION

Logical Reasoning	72.4
Decision Speed	65.5
Vigilance	62.1
Long Term Memory	55.2
Reaction Time	48.3
Acquisition	44.8
Short Term Memory	37.9

PATIENT RESUSCITATION

Decision Speed	69.0
Vigilance	62.1
Long Term Memory	59.4
Logical Reasoning	58.6
Reaction Time	48.3
Short Term Memory	44.4
Manual Dexterity	41.5

PATIENT EVACUATION

Logical Reasoning	77.8
Vigilance	59.3
Decision Speed	51.9
Short Term Memory	45.4
Long Term Memory	45.1
Reaction Time	44.3
Stamina	44.2

RADIO TALKING

Speaking Ability	75.0
Short Term Memory	62.5
Hearing Ability	59.4
Long Term Memory	53.1
Vigilance	50.0
Logical Reasoning	40.6
Decision Speed	31.3

FIRE SUPPORT CALLS

Speaking Ability	75.0
Short Term Memory	59.4
Calculations	55.4
Hearing Ability	53.1
Long Term Memory	43.8
Logical Reasoning	43.4
Vigilance	40.6

ROCK CLIMBING

Grip Strength	78.6
Climbing	76.8
Stamina	71.4
Vigilance	42.9
Logical Reasoning	39.4
Manual Dexterity	37.9
Eye-Hand Coordination	33.4

In addition to the printed database as it appears in this report, a computer database file is available on disk which operates under Microsoft Excel. The database allows one to identify what unique patterns of abilities are involved in particular Special Operations activities or to indicate what activities involve a specific ability of interest, such as visual acuity.

Additionally, from the database a summation was obtained across all of the activities to generate the overall frequencies of abilities, that is, to obtain the seven most often cited abilities, considering all activities combined. These abilities are presented below:

OVERALL SUMMARY OF SPECIAL OPERATIONS PERFORMANCE ABILITIES REQUIRED ACROSS ALL ACTIVITIES

Vigilance

Logical Reasoning

Short Term Memory

Reaction Time

Long Term Memory

Decision Speed

Calculations

Although it is appropriate to consider the development of a library of measures, established for the measurement of specific individual Special Operations mission performance based on information from the present database, it also appears appropriate to consider the measurement of critical abilities required in more universal Special Operations tasks. The above list of overall abilities may provide the information needed to guide the selection of measures of such general, basic critical performance abilities.